

Abstract

The impact of instructional materials designed to elicit two varying levels of perceived cognitive load on post-secondary introductory statistics students' self-efficacy, perceived knowledge, and demonstrated topic knowledge was examined. The chi-square test of independence was the focal topic. Lower and higher levels of perceived cognitive load were elicited using worked example and conventional problem solving methods, respectively. Participants were randomly assigned to the worked example or conventional problem solving condition. First, all participants completed pre-test measures of self-efficacy, perceived knowledge, and demonstrated knowledge. Self-efficacy and demonstrated knowledge were measured using researcher-developed scales while perceived knowledge was measured using two items in which participants were asked to rate their perceived knowledge of introductory statistics and the chi-square test of independence. Then participants watched an instructional video and completed three practice problems. Those who were assigned to the worked example group studied one worked example and then completed two conventional problems. Those who were assigned to the conventional problem solving group completed three conventional problems. Finally, participants completed post-test measures of self-efficacy, perceived knowledge, and demonstrated knowledge along with a demographic questionnaire. There were increases in self-efficacy, perceived knowledge of the chi-square test of independence, and demonstrated knowledge from the pre- to post-instruction administrations however there were no significant differences between the worked example and conventional problem solving groups. There was not a significant change in perceived knowledge of introductory statistics nor was there a difference in the group means. The correlations between demonstrated knowledge and each of the other variables were also examined for the worked example and conventional problem solving groups. Residual gain scores and Fisher's Z transformation were used to compare changes in the correlations between self-efficacy and demonstrated knowledge in the two groups. The worked example group saw a greater correlation

between residual gains than the conventional problem solving group ($r=.717$, $p<.001$, $n=51$; $r=.489$, $p<.001$, $n=49$, respectively). The difference between the correlations in the worked example and conventional problem solving groups was not statistically significant ($z=1.777$, $p=.076$). Given the results, more research on the relations between self-efficacy and experiences is needed before conclusions can be made.